

January 1, 2018

Actuarial Valuation Report

Lawrence Retirement System

Lawrence B. Stone



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May 11, 2018

Lawrence Retirement Board
354 Merrimack Street
Suite 302
Lawrence, MA 01843

Dear Lawrence Retirement Board:

Stone Consulting, Inc. has performed a January 1, 2018 actuarial valuation of the Lawrence Retirement System. This valuation and report was prepared using generally accepted actuarial principles and practices. To the best of our knowledge, this report is complete and accurate, and the assumptions used represent our best estimate of anticipated experience of the system except where noted in the text.

As part of performing the valuation, Stone Consulting, Inc. was furnished member data by the Lawrence Retirement System's administrative staff. Although examined for general reasonableness, the data was not audited by the actuary. In addition, the administrative staff furnished financial statements that were not audited by the actuary or by the plan's auditors.

The funding objective of the plan is to fully fund the system while attempting to maintain a stable contribution amount for the upcoming fiscal year that is consistent with prior funding schedules or if employer finances allow it, to increase the contribution amount. This funding objective is being met.

We anticipate over time the contribution level to stay level as a percentage of payroll. The contribution rate is determined by adding the normal cost plus an amortization of the unfunded actuarial accrued liability. The normal cost is expected to remain at a level percentage of payroll. The length of the funding schedule contained in this actuarial valuation report is seventeen years (fully funded in 2036). The amortization of the unfunded liability is set to increase by 3.24% annually.

The contribution amount for Fiscal Year 2020 is \$21,375,578 which is \$127,732 less than the anticipated contribution amount from the prior funding schedule. However, this decrease is due to the Lawrence Retirement System electing to make their contribution one month earlier, on July 1st as opposed to August 1st. For an August 1st contribution timing the amount would be \$1,451 greater than anticipated.

PERAC and GASB guidelines indicate that actuarial valuations should be conducted at least every other year. The Lawrence Retirement Board conducted their previous actuarial valuation effective January 1, 2016.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions, changes in economic or demographic assumptions, increases or decreases expected as part of natural operation of the methodology used for these measurements such as additional contribution requirements based on the plan's funded status, and changes in plan provisions or applicable law. As part of the valuation, we have not performed an analysis of the potential range of future measurements.

Stone Consulting, Inc. is completely independent of the Lawrence Retirement Board and the City of Lawrence. This includes any of its officers and key personnel. Neither we or anyone else closely associated with us has any relationship with the Lawrence Retirement Board or the City of Lawrence that would impair our independence, other than this or related assignments.

We are pleased to present the results of this valuation. If the Retirement Board has any questions on the content of this report, we would be glad to respond. Please note that this report is meant to be used in its entirety. Use of excerpts of this report may result in inaccurate or misleading understanding of the results.

I, Lawrence Stone, am a consultant for Stone Consulting, Inc. I am a member of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Respectfully submitted,
STONE CONSULTING, INC.
Actuaries for the Plan



Lawrence B. Stone
Member, American Academy of Actuaries

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Introduction

This report presents the results of the actuarial valuation of the Lawrence Retirement System. The valuation was performed at the request of the Retirement Board as of January 1, 2018 for the purpose of determining the contribution requirements for Fiscal Year 2020 and beyond. The contribution requirements are based on:

- The financial condition of the system as of December 31, 2017
- The benefit provisions of M.G.L. Chapter 32 and related statutes;
- The demographics of members in the system (i.e., active and inactive participants, retirees and beneficiaries as of January 1, 2018);
- Economic assumptions regarding salary increases and investment earnings; and
- Other actuarial assumptions (e.g., withdrawals, retirement, death, etc.)

Valuation Summary

	January 1, 2018 Valuation	January 1, 2016 Valuation	Change
Contribution Fiscal 2020	\$21,375,578	\$21,503,310	-\$127,732
Funding Schedule Length (as of Fiscal 2020)	18 years	17 years	1-year decrease
Amortization Increase	3.24%	3.60%	-0.36%
Funding Ratio	53%	46%	7%
Interest Rate Assumption	7.50%	7.75%	-0.25%
Salary Increase Rate Assumption	3.75% ultimate rate, plus 4.00% steps for the first 5 years of service	Same select and ultimate assumption	No change

- The Fiscal Year 2020 contribution is \$127,732 less than the anticipated contribution amount from the prior funding schedule. This is due to a change in contribution timing from August 1st to July 1st. For an August 1st timing the Fiscal 2020 contribution would be \$1,451 greater than the anticipated amount.
- Stone Consulting, with agreement from the Retirement Board, values assets using market value of assets.

- The System, over the two-year period from January 1, 2016 to December 31, 2017, experienced a 12.1% annual return on the market value of assets versus our assumption of 7.75%. There was a \$17,289,198 net actuarial gain in Calendar Years 2016 and 2017. The System's asset portfolio effective December 31, 2017 is approximately 80% equities and similar investments, and 20% fixed income and short-term investments. The interest rate assumption was reduced to 7.50% to reflect anticipated future market performance. This change increased the actuarial accrued liability by \$10.8 million.
- The investment return assumption is a long-term assumption and is based on capital market expectations by asset class, historical returns, and professional judgement.
- The salary increase assumption is based on a select and ultimate table, with a 3.75% ultimate rate. Employees receive 4.00% steps for their first five years of service. This assumption has been maintained from the prior valuation. Total compensation changed by 2.1% over the prior valuation; average annual compensation (compensation divided by number of active members) changed by 3.4%.
- The salary increase assumption reflects prior experience including PERAC's 2002 local experience study, current expectations, and professional judgement.
- The funding level of the Lawrence Retirement System is 53% compared to 46% for the January 1, 2016 actuarial valuation. The funding level is estimated to be below the median for Massachusetts' Contributory Retirement Systems.

The schedule length is seventeen (17) years, a one year reduction compared to the 18 years remaining from the 20 year schedule from the January 1, 2016 valuation. The maximum period permitted under Section 22F of Chapter 32 of the Massachusetts General Laws is twenty-one years (Fiscal 2040). The amortization of the unfunded liability increases by 3.24% each year. The annual increase in the amortization was formerly 3.60%.

- Non-economic assumptions were changed from the January 1, 2016 actuarial valuation. The mortality assumption is based upon the RP-2014 adjusted to 2006 and projected generationally using MP-2016. The previous assumption used the RP-2000 mortality table projected with generational mortality, scale BB, and a base year of 2000. The net effect of this change decreased the liability by \$1.6 million.

January 1, 2018 Actuarial Valuation Results

	January 1, 2018	January 1, 2016	Percentage Change
Funding			
Contribution for Fiscal 2020	\$21,375,578		-0.6%
Contribution for Fiscal 2020 based on current schedule		\$21,503,310	
Members			
■ Actives			
a. Number	1,580	1,600	-1.3%
b. Annual Compensation	\$71,471,870	\$69,995,537	2.1%
c. Average Annual Compensation	\$45,235	\$43,747	3.4%
d. Average Attained Age	43.8	44.0	-0.4%
e. Average Past Service	10.5	10.6	-1.2%
■ Retired, Disabled and Beneficiaries			
a. Number	911	887	2.7%
b. Total Benefits*	\$24,845,925	\$23,028,459	7.9%
c. Average Benefits*	\$27,273	\$25,962	5.0%
d. Average Age	73.5	73.7	-0.3%
■ Inactives			
a. Number	530	382	38.7%
Normal Cost			
a. Total Normal Cost as of January 1, 2018	\$9,147,742	\$8,737,363	4.7%
b. Less Expected Members' Contributions	<u>6,617,850</u>	<u>6,472,234</u>	2.2%
c. Normal Cost to be funded by the Municipality	\$2,529,892	\$2,265,129	11.7%
d. Adjustment to July 1, 2019	162,982	145,926	11.7%
e. Administrative Expense Assumption	<u>525,906</u>	<u>493,786</u>	6.5%
f. Normal Cost Adjusted to July 1, 2019	\$3,218,780	\$2,904,840	10.8%
Actuarial Accrued Liability as of January 1, 2018			
a. Active Members	\$182,247,103	\$173,821,085	4.8%
b. Inactive Members	6,051,549	3,774,505	60.3%
c. Retired Members and Beneficiaries	<u>243,143,059</u>	<u>220,436,118</u>	10.3%
d. Total	\$431,441,711	\$398,031,708	8.4%
Unfunded Actuarial Accrued Liability			
a. Actuarial Accrued Liability as of January 1, 2018	\$431,441,711	\$398,031,708	8.4%
b. Less Actuarial Value of Assets as of January 1, 2018	<u>227,442,528</u>	<u>182,660,273</u>	24.5%
c. Unfunded Actuarial Accrued Liability as of January 1, 2018	\$203,999,183	\$215,371,436	-5.3%
d. Adjustment to July 1, 2019	<u>5,932,511</u>	<u>9,163,575</u>	
e. Unfunded Actuarial Accrued Liability as of July 1, 2019	\$209,931,694	\$224,535,011	

*Excluding State reimbursed COLA

Data and History of Active Participants

- The data was supplied by the Lawrence Retirement Board. The data was checked under broad parameters for reasonableness. With the assistance of the staff of the Lawrence Retirement Board, we were able to develop a database sufficient for valuation purposes.

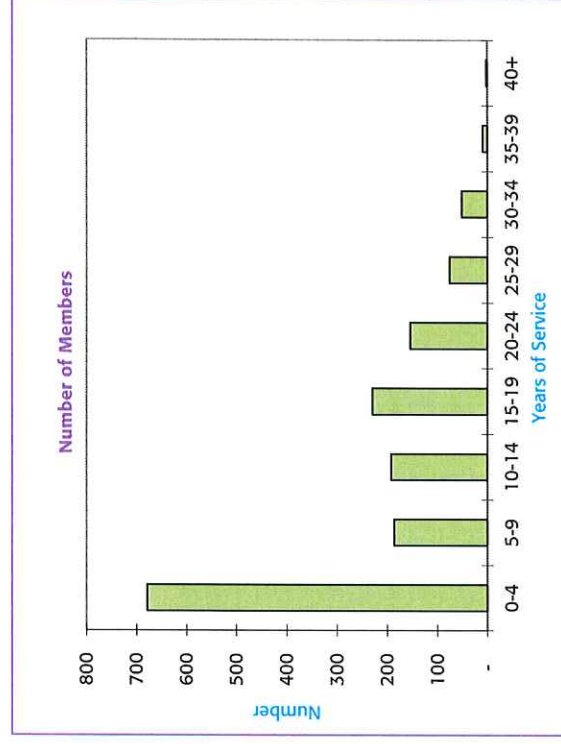
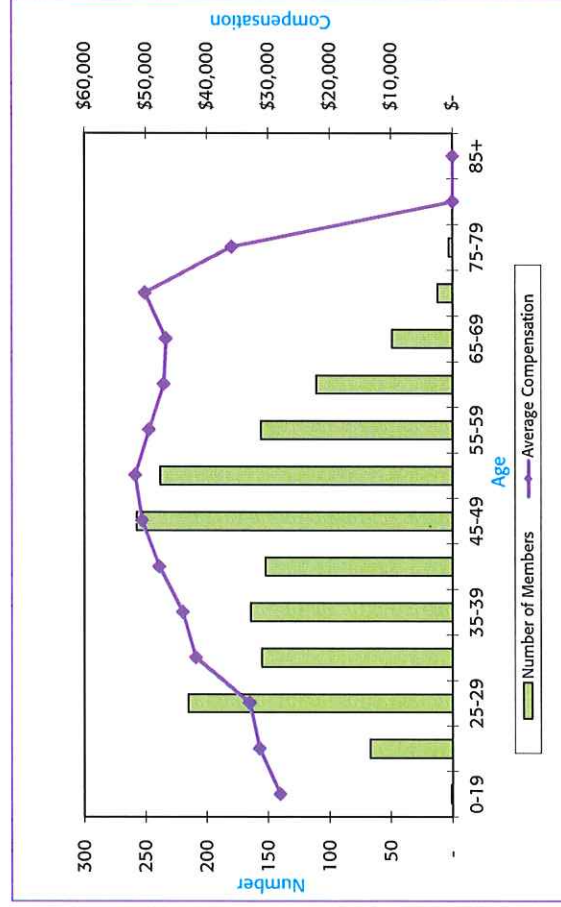
Valuation Year	Number	Average Age	Average Past Service	Average Ann'l Compensation
2018	1,580	43.8	10.5	\$45,235
2016	1,600	44.0	10.6	\$43,747
2014	1,519	44.6	10.8	\$44,613
2012	1,313	45.9	11.9	\$42,473
2010	1,368	45.2	11.4	\$42,274
2008	1,503	44.6	10.4	\$39,639
2007	1,517	44.3	9.9	\$39,010
2004	1,569	42.4	8.1	\$32,094
2003	1,734	41.9	7.4	\$30,923
2000	1,672	42.4	8.4	\$27,567

- Employee age has increased by 1.4 years and service has increased by 2.1 years over the course of the past eighteen years. This is consistent with the trend in the Commonwealth towards an aging of the employee population as well as a slowing down and a recent reversal of that trend. Average annual compensation has grown by 64.1% (2.8% annually) over the same time period.

The charts on the following pages summarize demographic information regarding active and retiree members.

Distribution of Plan Members as of January 1, 2018 ACTIVE MEMBERS

AGE	0-4 Years	5-9 Years	10-14 Years	15-19 Years	20-24 Years	25-29 Years	30-34 Years	35-39 Years	40 + Years	Total	Total Compensation	Average Compensation
0-19	1	-	-	-	-	-	-	-	-	1	\$ 28,057	\$ 28,057
20-24	67	-	-	-	-	-	-	-	-	67	\$ 2,107,975	\$ 31,462
25-29	206	9	-	-	-	-	-	-	-	215	\$ 7,101,472	\$ 33,030
30-34	101	38	16	-	-	-	-	-	-	155	\$ 6,478,696	\$ 41,798
35-39	76	34	32	22	-	-	-	-	-	164	\$ 7,215,062	\$ 43,994
40-44	48	29	28	41	6	-	-	-	-	152	\$ 7,266,778	\$ 47,808
45-49	91	23	35	55	45	8	-	-	-	257	\$ 13,010,734	\$ 50,625
50-54	48	23	35	50	39	29	14	-	-	238	\$ 12,317,843	\$ 51,756
55-59	22	18	20	32	25	20	13	6	-	156	\$ 7,719,361	\$ 49,483
60-64	11	9	21	22	28	7	11	1	1	111	\$ 5,227,669	\$ 47,096
65-69	6	2	4	7	10	10	9	1	-	49	\$ 2,288,971	\$ 46,714
70-74	2	1	1	-	2	2	2	1	1	12	\$ 601,515	\$ 50,126
75-79	-	-	-	1	-	-	2	-	-	3	\$ 107,739	\$ 35,913
80-84	-	-	-	-	-	-	-	-	-	-	\$ -	\$ -
85+	-	-	-	-	-	-	-	-	-	-	\$ -	\$ -
TOTAL	679	186	192	230	155	76	51	9	2	1,580	\$ 71,471,870	\$ 45,235



Distribution of Plan Members as of January 1, 2018

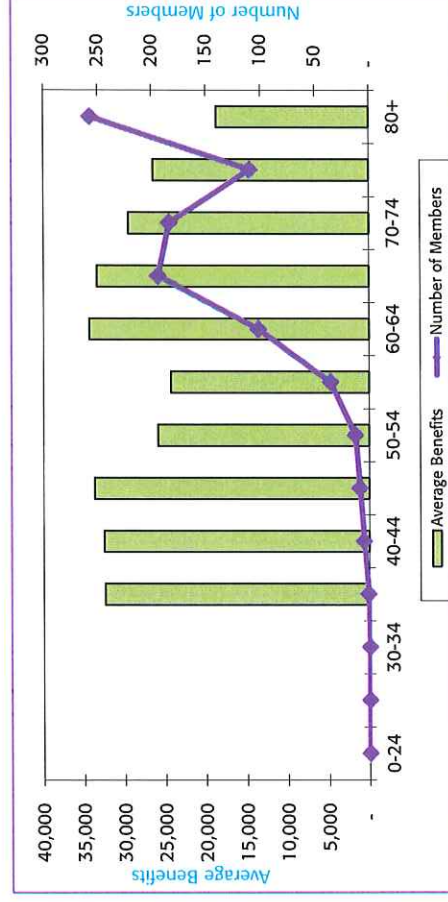
RETIRED MEMBERS

Retired Members and Beneficiaries			
Age	Number	Average Benefit	Total Benefit
0-24	-	-	-
25-29	-	-	-
30-34	-	-	-
35-39	-	-	-
40-44	2	10,601	21,202
45-49	2	31,574	63,147
50-54	9	21,788	196,089
55-59	24	16,051	385,212
60-64	85	32,622	2,772,866
65-69	168	32,622	5,480,442
70-74	148	28,221	4,176,642
75-79	100	25,828	2,582,761
80+	239	18,160	4,340,164
TOTAL	777	\$ 25,764	\$ 20,018,524

Total			
Age	Number	Average Benefit	Total Benefit
0-24	-	-	-
25-29	-	-	-
30-34	-	-	-
35-39	1	32,435	32,435
40-44	5	32,557	162,784
45-49	9	33,716	303,442
50-54	13	25,891	336,582
55-59	36	24,320	875,519
60-64	102	34,350	3,503,701
65-69	194	33,423	6,484,138
70-74	184	29,549	5,436,963
75-79	110	26,435	2,907,803
80+	257	18,687	4,802,559
TOTAL	911	\$ 27,273	\$ 24,845,925

Benefits shown are net of State reimbursed COLA.

Disabled Members			
Age	Number	Average Benefit	Total Benefit
0-24	-	-	-
25-29	-	-	-
30-34	-	-	-
35-39	1	32,435	32,435
40-44	3	47,194	141,582
45-49	7	34,328	240,294
50-54	4	35,123	140,493
55-59	12	40,859	490,307
60-64	17	42,990	730,835
65-69	26	38,604	1,003,697
70-74	36	35,009	1,260,321
75-79	10	32,504	325,043
80+	18	25,689	462,395
TOTAL	134	\$ 36,025	\$ 4,827,401



Valuation Methodology

Stone Consulting, Inc. used the Entry Age Normal actuarial funding method in this actuarial valuation. The use of the Entry Age Normal actuarial funding method is consistent with the requirements of Chapter 32 of the Massachusetts General Laws.

NORMAL COST

	January 1, 2018	% of Payroll*
Gross Normal Cost (GNC)	\$9,147,742	12.8%
Employees Contribution	<u>(6,617,850)</u>	(9.3%)
Net Normal Cost (NNC)	\$2,529,892	3.5%
Adjusted to Beginning of Fiscal Year 2020	162,982	
Administrative Expense	<u>525,906</u>	0.7%
Adjusted Net Normal Cost With Admin. Expense	\$3,218,780	

*Payroll paid in 2017 for employees as of January 1, 2018 is \$71,471,870. Payroll for new hires in 2017 was annualized. Totals may not sum due to rounding.

- The gross normal cost (GNC) is the "price" of benefits accruing in the current year if the assumptions underlying the normal cost were realized.
- An individual normal cost represents that part of the cost of a member's future benefits that are assigned to the current year as if the costs are to remain level as a percentage of the member's pay. Benefits payable under all circumstances (i.e., retirement, death, disability, and withdrawals) are included in this calculation.
- Anticipated employee contributions to be made during the year are subtracted from the GNC to determine employer normal cost, or net normal cost (NNC).
- Administrative expenses added to the NNC. The administrative expense does not include investment manager and custodial fees. These fees are considered part of the interest rate assumption that is net of fees.

Actuarial Accrued Liability and Funded Status

		January 1, 2018	Percentage Change
Active Actuarial Accrued Liability		\$ 182,247,103	4.8%
Superannuation	\$ 166,346,330		
Death	\$ 3,695,093		
Disability	\$ 10,229,305		
Withdrawal	\$ 1,976,375		
Retiree, Inactive, Survivor and Beneficiary Actuarial Accrued Liability		\$ 249,194,608	11.1%
Retirees and Beneficiaries	\$ 190,702,040		
Disabled	\$ 52,441,019		
Inactive	\$ 6,051,549		
Total Actuarial Accrued Liability (AAL)		\$ 431,441,711	8.4%
Actuarial Value of Assets (AVA)		\$ 227,442,528	24.5%
Unfunded Actuarial Accrued Liability		\$ 203,999,183	-5.3%
Funded Ratio (AVA / AAL)			
2018 (7.50% interest rate):		53%	
2016 (7.75% interest rate):		46%	

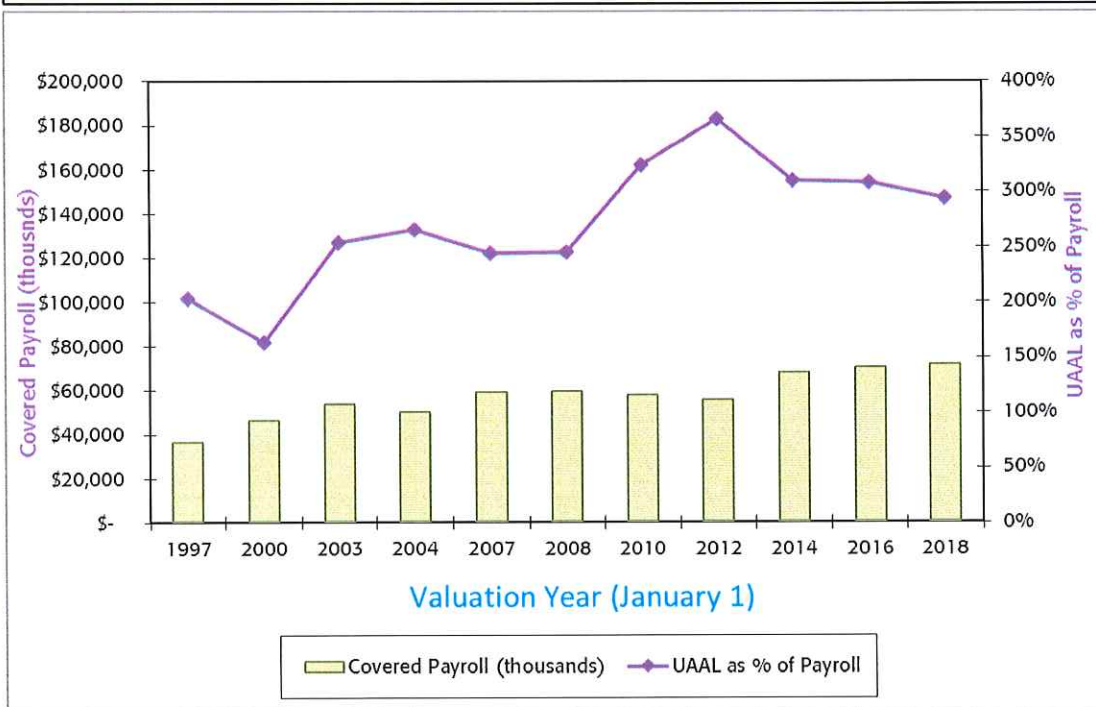
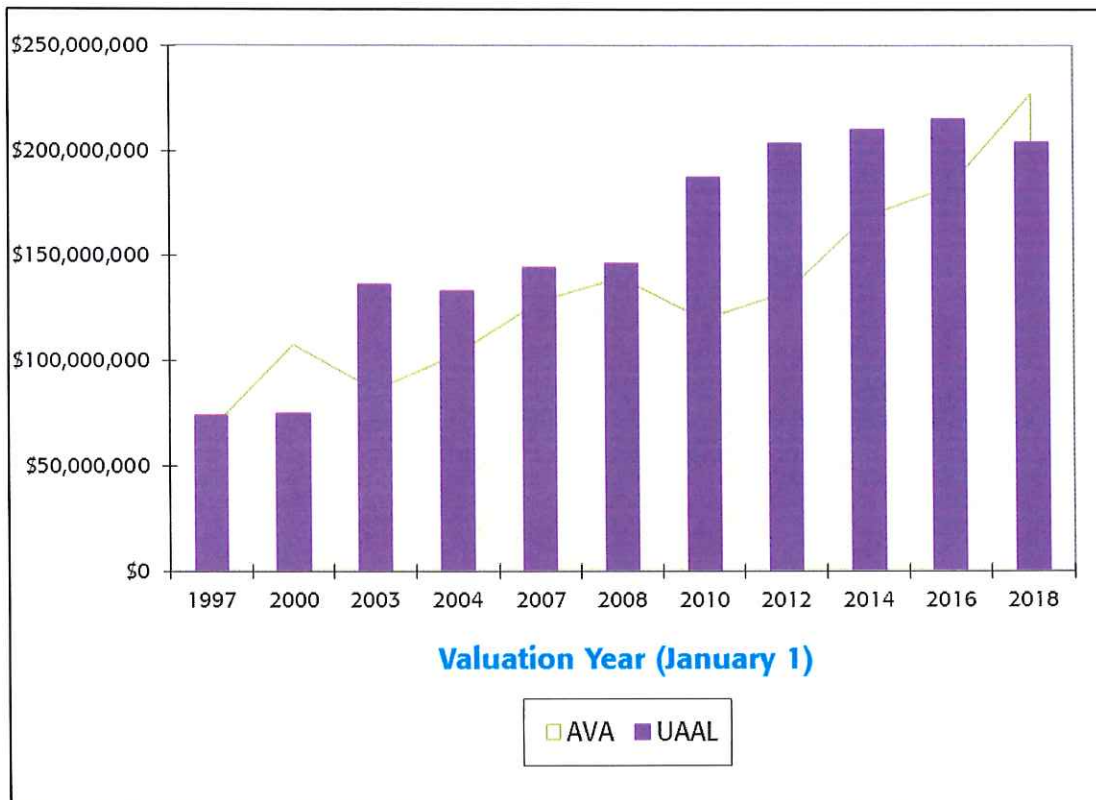
- Actuarial Accrued Liability (AAL) is the "price" of benefits attributable to benefits earned in past years, or in other words, represents today's value of all benefits earned by active and inactive members.

The total AAL is \$431,441,711. This along with an actuarial value of assets of \$227,442,528 produces a funded status of 53%. This compares to a funded status of 46% for the 2016 valuation.

The UAAL and funded ratio are measures of the plan's funded status. These measures reflect the plan's position as of January 1, 2016. We believe these measures, by themselves, are not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations or assessing the need for or the amount of future contributions. However, we believe these measures, in conjunction with the plan's funding schedule, are appropriate for assessing the amount of future contributions.

The chart on the following page contains a history of the unfunded actuarial accrued liability (UAAL), covered payroll, and valuation assets (AVA) over the course of the past eleven actuarial valuations.

Charts of Selected Actuarial and Demographic Statistics



Development of Funding Schedule

Net Employer Normal Cost for Fiscal 2020 (including admin. expenses)	\$ 3,218,780
Net 3(8)(c) Payments	1,051,536
Amortization	<u>17,105,261</u>
Total Appropriation required for Fiscal 2020	\$ 21,375,578

- The funding schedule is composed of the normal cost, the net 3(8)(c) payments and the amortization of the actuarial accrued unfunded liability and is adjusted by the administrative expense assumption. The contribution is assumed to be made at the beginning of the fiscal year. The 3(8)(c) payments are the amount that the Lawrence Retirement System pays to or receives from other retirement boards for service that a retiree had with a different retirement system. The net 3(8)(c) payments is the difference between what the Lawrence Retirement System paid out minus what was received by the System.
- The contribution amount for Fiscal 2020 is \$21,375,578. The funding schedule is presented on page 11. The schedule's length is seventeen (17) years (for the fresh start base) which is equal to the remainder of the 18 year schedule from the January 1, 2016 valuation. The maximum funding schedule length allowed by Section 22F of Chapter 32 of the Massachusetts General Laws is twenty-one years to Fiscal 2040.
- In developing the funding schedule, we used a fresh start approach in which the unfunded actuarial accrued liability (UAAL), other than the UAAL due to past early retirement incentives, is reamortized instead of maintaining the existing amortization amount and separately amortizing the actuarial gain or loss. The use of a fresh-start approach can result in a funding schedule in which the changes in contribution amounts from year to year are more consistent. The amortization increases each year at a rate of 3.24%.
- The Merrimack Valley Regional Transit Authority (MVRTA) made an additional contribution of \$647,679 on July 10, 2017 to pay off the remainder of the liability associated with a CRAB decision granting additional service to members who had worked for the MVRTA prior to the Authority becoming part of the Lawrence Retirement System. This has been accounted for in the results and funding schedule.

LAWRENCE CONTRIBUTORY RETIREMENT SYSTEM

FUNDING SCHEDULE

Fiscal Year	Normal Cost	Unfunded Liability	Funding Amortization of UAAL	Net 3(8)(c) Payments	Schedule Contribution	Adjusted Payments
2020	3,218,780	209,931,694	17,105,261	1,051,536	21,375,578	21,375,578
2021	3,355,578	207,288,416	17,667,121	1,051,536	22,074,235	22,074,235
2022	3,498,190	203,842,892	18,247,491	1,051,536	22,797,217	22,797,217
2023	3,646,863	199,515,056	18,846,983	1,051,536	23,545,383	23,545,383
2024	3,801,855	194,218,178	19,466,231	1,051,536	24,319,622	24,319,622
2025	3,963,434	187,858,344	20,105,886	1,051,536	25,120,856	25,120,856
2026	4,131,880	180,333,892	20,766,625	1,051,536	25,950,041	25,950,041
2027	4,307,485	171,534,811	21,449,145	1,051,536	26,808,166	26,808,166
2028	4,490,553	161,342,092	22,154,165	1,051,536	27,696,254	27,696,254
2029	4,681,401	149,627,021	21,454,552	1,051,536	27,187,490	27,187,490
2030	4,880,361	137,785,404	22,149,680	1,051,536	28,081,577	28,081,577
2031	5,087,776	124,308,404	22,867,329	1,051,536	29,006,642	29,006,642
2032	5,304,007	109,049,155	23,608,231	1,051,536	29,963,774	29,963,774
2033	5,529,427	91,848,994	24,373,137	1,051,536	30,954,101	30,954,101
2034	5,764,428	72,536,546	25,162,827	1,051,536	31,978,791	31,978,791
2035	6,009,416	50,926,747	25,978,103	1,051,536	33,039,055	33,039,055
2036	6,264,816	26,819,793	26,819,793	1,051,536	34,136,145	34,136,145
2037	6,531,071	-	-	1,051,536	7,582,607	7,582,607

Amortization of Unfunded Liability as of July 1, 2019

Year	Type	Original Amort. Amount	Percentage Increasing	Original # of Years	Current Amort. Amount	Years Remaining
2005	ERI2002-LHA	2,746	4.50%	24	5,267	9
2005	ERI 2002-VOC	19,415	4.00%	24	34,661	9
2005	ERI2002-City	405,220	4.00%	24	723,412	9
2005	ERI2003-City	129,504	4.00%	24	231,194	9
2005	ERI2003-VOC	4,729	4.00%	24	8,443	9
2020	Fresh Start	16,102,284	3.24%	17	16,102,284	17

Notes on Amortization of Unfunded Liability

Year is the year the amortization base was established. **Type** is the reason for the creation of the base. **Original Amortization Amount** is the annual amortization amount when the base was established. **Percentage Increasing** is the percentage that the Original Amortization Amount increases per year. **Original # of Years** is the number of years over which the base is being amortized. **Current Amortization Amount** is the amortization payment amount for this year. **Years Remaining** is the number of years left to amortize the base.

Assumptions and Methodology Summary

The principal actuarial assumptions used in this valuation are the same as the assumptions used in the previous valuation, except where noted, and are summarized in the following table:

Valuation Date	January 1, 2018 Valuation
Interest Rate	7.50% (7.75% in prior valuation).
Salary Increase	3.75% ultimate rate, plus 4.00% steps for the first 5 years of service
COLA	3% of \$12,000
COLA Frequency	Granted every year
Mortality	RP-2014 adjusted to 2006 and projected generationally using MP-2016. For members retired under an Accidental Disability (job-related), 40% of deaths are assumed to be from the same cause as the disability. Disabled mortality RP-2014 adjusted to 2006 and projected generationally using MP-2016, ages set forward 2 years. (Prior valuation used RP-2000 mortality table projected with generational mortality, scale BB, and a base year of 2000.)
Overall Disability	Groups 1 and 2 50% ordinary disability 50% accidental disability Group 4 10% ordinary disability 90% accidental disability
Retirement Rates	Groups 1 and 2 Ages 50 – 70 Group 4 Ages 50 – 65
Administrative Expense	\$525,906 budget estimated for FY 2020 provided by Lawrence Retirement Board.

Assets

	Cash	\$	728,208.92
	PRIT Cash		1,003,546.77
	PRIT FUND		<u>226,646,366.11</u>
A	Sub-Total:	\$	228,378,121.80
	Prepaid Expenses		12,937.68
	Accounts Receivable		387,998.01
	Accounts Payable		<u>(1,336,529.55)</u>
B	Sub-Total:	\$	(935,593.86)
	Market Value of Assets [(A) + (B)]	\$	227,442,527.94

- We were furnished with the System's annual report by the Board. The market value of assets as of December 31, 2017 (adjusted for payables and receivables) is \$227,442,527.94.
- The asset allocation is approximately 20% fixed income, cash, receivables and payables and 80% equities, alternative investments, hedge funds and similar types of investments. Historically, 10% to 11% has been the expected long-term rate of return for equities, and 6% to 7% has been the expected long-term rate of return for fixed income securities. Many economists and investment professionals are projecting lower returns of 5% to 8% for equities and 3% to 6% for fixed income securities. In light of these projections, as well as historical investment returns, the 7.50% interest rate assumption is within the reasonable assumption range. We encourage close monitoring for changes in investment performance against expectations.

Disclosure Information

SCHEDULES OF FUNDING PROGRESS

(Dollars In Thousands)

Actuarial Valuation Date	Actuarial Value of Assets A	Actuarial Accrued Liability B	Unfunded AAL (UAAL) B-A	Funded Ratio A/B	Covered Payroll C	UAAL as a % of Covered Payroll (B-A)/C
1/1/2018	\$227,443	\$431,442	\$203,999	53%	\$71,472	285%
1/1/2016	\$182,660	\$398,032	\$215,371	46%	\$69,996	308%
1/1/2014	\$168,979	\$379,183	\$210,203	45%	\$67,767	310%
1/1/2012	\$132,575	\$336,057	\$203,482	39%	\$55,767	365%
1/1/2010	\$120,292	\$307,626	\$187,334	39%	\$57,831	324%

NOTES TO SCHEDULES

Additional information as of the latest actuarial valuation follows:

Valuation Date	1/1/2018
Actuarial cost method	Entry Age Normal
Amortization method	3.24% amortization increase
Remaining amortization period	17 years for the fresh start base
Asset valuation method	Market value adjusted by accounts payable and receivables. Market value of assets is \$227,442,527.94
<u>Actuarial assumptions:</u>	
Investment Rate of Return	7.50% per year
Projected Salary Increases	4.00% steps for the first five year of service
	<u>Ultimate Rate:</u> 3.75%

PERAC Information Disclosure

The most recent actuarial valuation of the System was prepared by Stone Consulting, Inc. as of January 1, 2018

The normal cost for employees on that date was:	\$6,617,850	9.3% of payroll
The normal cost for the employer was:	\$2,529,892	3.5% of payroll

The actuarial liability for active members was:	\$182,247,103
The actuarial liability for retired members was (includes inactives):	\$249,194,608
Total actuarial accrued liability:	\$431,441,711
System assets as of that date (\$227,442,527.94 Market Value):	\$227,442,528
Unfunded actuarial accrued liability:	\$203,999,183

The ratio of system's assets to total actuarial liability was:	53%
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As of that date the total covered employee payroll was:	\$71,471,870
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The principal actuarial assumptions used in the valuation are as follows:

Investment Return:	7.50% per annum
Rate of Salary Increase:	Select and ultimate rate (3.75% ultimate rate)

SCHEDULE OF FUNDING PROGRESS (Dollars in \$000's)

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded AAL (UAAL) (b-a)	Funded Ratio (a/b)	Covered Payroll (c)	UAAL as a % of Covered Payroll ((b-a)/c)
1/1/2018	\$227,443	\$431,442	\$203,999	53%	\$71,472	285%
1/1/2016	\$182,660	\$398,032	\$215,371	46%	\$69,996	308%
1/1/2014	\$168,979	\$379,183	\$210,203	45%	\$67,767	310%
1/1/2012	\$132,575	\$336,057	\$203,482	39%	\$55,767	365%
1/1/2010	\$120,292	\$307,626	\$187,334	39%	\$57,831	324%

Actuarial Methods and Assumptions

ACTUARIAL METHODS

Actuarial Cost Method

The Entry Age Normal Actuarial Cost Method has been used in this valuation. Under this method, the normal cost is the amount calculated as the level percentage of compensation necessary to fully fund the prospective benefits from each member's entry age to retirement age.

The actuarial accrued liability represents the theoretical accumulation of all prior years' normal costs for the plan members as if the program had always been in effect. The unfunded actuarial accrued liability is the excess of the actuarial accrued liability over plan assets.

Asset Valuation Method

Market value of assets (adjusted by payables and receivables).

Fiscal Year Adjustment

The actuarial results are adjusted by the valuation interest rate and salary scale to the beginning of Fiscal Year 2020. The unfunded actuarial accrued liability is rolled forward with normal cost and further adjusted by anticipated contributions and interest.

ACTUARIAL ASSUMPTIONS

Investment Return

7.50% per year net of investment expenses.

Regular Interest Rate Credited to Annuity Savings Account

2% per year.

Salary Increases

Select and Ultimate assumption – 5 years of 4.00% steps. 3.75% ultimate rate.

Total Payroll Increase

The total payroll is assumed to increase at 4.25% per year.

Valuation Date

January 1, 2018.

Actuarial Methods and Assumptions
(Continued)

Withdrawal Prior to Retirement

The rates shown at the following sample ages illustrate the withdrawal assumption. Withdrawal rates are set to zero if the retirement rate at that age is nonzero.

Rate of Withdrawal

Service	Group 1 and 2	Group 4
0	15%	1.5%
1	12%	1.5%
2	10%	1.5%
3	9%	1.5%
4	8%	1.5%
5	7.6%	1.5%
10	5.4%	1.5%
15	3.3%	0.0%
20	2.0%	0.0%
25	1.0%	0.0%
30+	0.0%	0.0%

Disability Prior to Retirement

The rates shown at the following sample ages illustrate the assumption regarding the incidence of disability:

Rate of Disability

Age	Group 1 and 2	Group 4
20	0.01%	0.10%
25	0.02%	0.20%
30	0.03%	0.30%
35	0.06%	0.30%
40	0.10%	0.30%
45	0.15%	1.00%
50	0.19%	1.25%
55	0.24%	1.20%
60	0.28%	0.85%

Disability is assumed to be 50% ordinary and 50% accidental for Group 1 and 2 and 10% ordinary and 90% accidental for Group 4.

Actuarial Methods and Assumptions
(Continued)

Rates of Retirement

The rates shown at the following ages illustrate the assumption regarding the incidence of retirement, once the member has achieved 10 years of service:

Age	Group 1 & 2 Male	Group 1 & 2 Female	Group 4	Hired after 4/1/2012		
				Group 1 & 2 Male	Group 1 & 2 Female	Group 4
50	1%	1.5%	2%	0%	0%	0%
51	1%	1.5%	2%	0%	0%	0%
52	1%	2.0%	2%	0%	0%	0%
53	1%	2.5%	2%	0%	0%	0%
54	2%	2.5%	7.5%	0%	0%	0%
55	2%	5.5%	15%	0%	0%	10%
56	2.5%	6.5%	10%	0%	0%	7%
57	2.5%	6.5%	10%	0%	0%	20%
58	5%	6.5%	10%	0%	0%	10%
59	6.5%	6.5%	15%	0%	0%	15%
60	12%	5%	20%	25%	30%	20%
61	20%	13%	20%	20%	13%	20%
62	30%	15%	25%	30%	15%	25%
63	25%	12.5%	25%	25%	12.5%	25%
64	22%	18%	30%	22%	18%	30%
65	40%	15%	100%	40%	15%	100%
66	25%	20%	N/A	25%	20%	N/A
67	25%	20%	N/A	25%	20%	N/A
68	30%	25%	N/A	30%	25%	N/A
69	30%	20%	N/A	30%	20%	N/A
70	100%	100%	N/A	100%	100%	N/A

Mortality

RP-2014 adjusted to 2006 and projected generationally using MP-2016 (sex-distinct). (Prior valuation used RP-2000 mortality table projected with generational mortality, scale BB, and a base year of 2000). During employment the healthy employee mortality table is used. Post-employment the healthy annuitant table is used. In-service death is assumed to be 55% accidental for group 1 and 2 and 90% accidental for group 4.

Disabled Life Mortality

RP-2014 adjusted to 2006 and projected generationally using MP-2016 for healthy annuitants, set-forward by 2 years (sex-distinct). Death is assumed to be due to the same cause as the disability 40% of the time. (Prior valuation used RP-2000 mortality table projected with generational mortality, scale BB, and a base year of 2000).

Actuarial Methods and Assumptions (Continued)

Family Composition

Members assumed married with 2 dependent children – one male and one female both age 15; age difference between member and spouse assumed to be 3 years (the male being the older).

Cost-of-Living Increases

A 3% COLA on the first \$12,000 of a member's retirement allowance is assumed to be granted every year.

Administrative Expenses

Estimated budgeted amount of \$525,906 for the Fiscal Year 2020 excluding investment management fees and custodial fee is added to the Normal Cost.

Net 3(8)(c)

Net 3(8)(c) payments are assumed to be the same level as the past calendar year for all future years.

Step Increases

Step increases are assumed to be part of the salary increase assumption.

Credited Service

All service is assumed to be due to employment with the municipality.

Contribution Timing

Contributions are assumed to be made at the beginning of the fiscal year.

Summary of Principal Provisions

1. PARTICIPANT

Participation is mandatory for all full-time employees whose employment commences before age 65. There are three classes of members in the retirement system:

- Group 1: general employees
- Group 2: employees in specified hazardous occupations (e.g., electricians)
- Group 4: police and firefighters

2. MEMBER CONTRIBUTIONS

Member contributions vary depending upon date hired as follows:

Date of Hire	Member Contribution Rate
Prior to 1975	5% of Pay
1975 – 1983	7% of Pay
1984 – June 30, 1996	8% of Pay
After June 30, 1996	9% of Pay

Members hired after 1978 contribute an additional 2% of pay over \$30,000.

3. PAY

a. Pay

Gross regular compensation excluding bonuses, overtime, severance pay, unused sick pay, and other similar compensation.

b. Average Pay

The average of pay during the three consecutive years that produce the highest average or, if greater, during the last three years (whether or not consecutive) preceding retirement. For members hired after April 1, 2012, five-year averages will be used.

4. CREDITED SERVICE

Period during which an employee contributes to the retirement system plus certain periods of military service and "purchased" service.

5. SERVICE RETIREMENT

a. Eligibility

Hired prior to April 2, 2012: Attainment of age 55 and completion of ten years of credited service or at any age with completion of 20 years of service. If hired prior to 1978 or a member of Group 4, the completion of ten years of service is not required.

Hired after April 1, 2012: Group 1 – Age 60 and Completion of 10 years of credited service; Group 2 – Age 55 and completion of 10 years of service; Group 4 – Age 55.

Summary of Principal Provisions (Continued)

b. Retirement Allowance

Determined as the product of the member's benefit percentage, average pay and credited service, where the benefit percentage is shown below (maximum allowance of 80% of average pay):

Benefit Percentage	Group 1	Group 2	Group 4
2.5%	65+	60+	55+
2.4	64	59	54
2.3	63	58	53
2.2	62	57	52
2.1	61	56	51
2.0	60	55	50
1.9	59	N/A	49
1.8	58	N/A	48
1.7	57	N/A	47
1.6	56	N/A	46
1.5	55	N/A	45
Hired after April 1, 2012*			
2.5%	67+	62+	57+
2.35	66	61	56
2.20	65	60	55
2.05	64	59	54
1.90	63	58	53
1.75	62	57	52
1.60	61	56	51
1.45	60	55	50

*Reduction is .125% for each year early instead of .15% per year for employees with over 30 years of service.

In addition, veterans receive an additional \$15 per year for each year of credited service up to 20 years

6. DEFERRED VESTED RETIREMENT

a. Eligibility

Completion of 10 years of credited service (for elected and appointed members, 6 years in the event of involuntary termination).

b. Retirement Allowance

Determined in the same manner as "Service Retirement" section above with the member eligible to start collecting a benefit at age 55, (or age 57 for post-April 1, 2012 hires) or defer until later at his or her discretion. If a member chooses, his or her contributions with interest may be withdrawn. The amount of interest he or she will receive depends on length of service and whether or not the termination of employment was voluntary.

Summary of Principal Provisions (Continued)

7. ORDINARY DISABILITY RETIREMENT

a. Eligibility

Non-job related disability after completion of 10 years of credited service.

b. Retirement Allowance

Determined in the same manner as "Service Retirement" section and calculated as if the member had attained age 55 (or age 57 for those hired after April 1, 2012), if younger. Veterans receive 50% of pay (during final year) plus an annuity based on accumulated member contributions with interest.

8. ACCIDENTAL DISABILITY RETIREMENT

a. Eligibility

Disabled as a result of an accident in the performance of duties. No age or service requirement.

b. Retirement Allowance

72% of pay plus an annuity based on accumulated member contributions with interest. Also, a dependent's allowance per year for each child. Total allowance not to exceed 100% of pay (75% for members hired after 1987).

9. NON-OCCUPATIONAL DEATH

a. Eligibility

Dies while in active service, but not due to occupational injury. 2 years of service.

b. Retirement Allowance

Benefit as if Option C had been elected (see below) and member had attained age 55 (or age 57 for those hired after April 1, 2012) if younger. Minimum monthly benefits provided as follows: spouse - \$500, first child - \$120, each additional child - \$90

10. OCCUPATIONAL DEATH

a. Eligibility

Dies as a result of an occupational injury.

b. Benefit Amount

72% of pay plus refund of annuity savings fund balance. In the case of an accidental disability retiree who dies of the same cause, the beneficiary receives 72% of the last 12 months salary or the current pension amount, whichever is greater.

Summary of Principal Provisions (Continued)

11. COST-OF-LIVING INCREASES

An increase of up to 3% applied to the first \$12,000 of annual benefit. Funded by the Municipality from Fiscal Year 1999. Percentage increase is voted on each year by the Retirement Board. Cost-of-living increases granted during Fiscal Year 1982 through Fiscal 1998 are reimbursed by the Commonwealth.

12. OPTIONAL FORMS OF PAYMENT

■ Option A

Allowance payable monthly for the life of the member.

■ Option B

Allowance payable monthly for the life of the member with a guarantee of remaining member contributions with interest.

■ Option C

Allowance payable monthly for the life of the member with 66-2/3% continuing to the member's beneficiary upon the member's death. If the beneficiary predeceases the member, the allowance amount "pops up" to the non-reduced amount.

Glossary of Terms

■ Actuarial Accrued Liability

The portion of the Present Value of Benefits that is attributable to past service.

■ Actuarial Assumptions

Estimates are made as to the occurrence of certain events that determine the level of benefits to be paid and how long they will be provided. The more important actuarial assumptions include the investment return on assets, salary increases and the rates of turnover, disability, retirement and mortality.

■ **Actuarial Cost Method**

The procedure that is used to allocate the present value of benefits between the liability that is attributable to past service (Actuarial Accrued Liability) and that attributable to future service.

■ **GASB**

Government Accounting Standards Board (issues guidance for disclosure of retirement system liabilities).

■ **Normal Cost**

The portion of the Present Value of Benefits that is attributable to benefits to be earned in the coming year.

■ **PERAC**

Public Employee Retirement Administration Commission, a division of the State government which has regulatory authority over the administration of the retirement system.

■ **Present Value of Benefits**

Represents the dollar value today of all benefits expected to be earned by current members if all actuarial assumptions are exactly realized.

■ **PRIT**

Pension Reserves Investment Trust Fund is the state controlled and administered fund for the investment of assets for members of the retirement system.

■ **Unfunded Actuarial Accrued Liability**

That portion of the Actuarial Accrued Liability not covered by System Assets.